THE BENGAL TIGER

by

LOREN P. WOODS
Raymond Foundation

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THE BENGAL TIGER

BENGAL TIGER

If you have read the *Jungle Book* you will remember that the tiger plays the part of the villain in the jungles and forests of India. The tiger *is* the villain, especially to the plant-eating animals on which he preys and of course to the smaller creatures of the forest and plain. Old male tigers may even become known as "man-eaters."

A male tiger usually lives by himself in one particular area in the jungle and is as familiar with the paths, trees, and streams as you might be with your nearest park. He knows where his favorite food animals graze, and upon awakening he travels stealthily to the spot. His hunting foray usually does not begin until after dark, for then it is easier for him to keep hidden and the game may be much more easily approached. Besides this, the watchful monkeys, who noisily warn all animals of the jungle when a tiger is approaching, are fast asleep in the trees.

Perhaps the tiger sights a tender young deer. Long before the deer sees him (because tigers are able to see in very dim light), he sinks close to the ground and creeps forward on the soft pads that cover the bottoms of his feet. Suddenly, with a rush, he leaps upon his prey, his strong claws and teeth and powerfully muscled frame making this attack on a weak deer swift and easy; wild pigs and water buffaloes, which he sometimes attacks, are stronger enemies and occasionally the tiger may be wounded or even killed.

Once the tiger's prey is brought down he crouches beside it and beginning at the hind quarters proceeds to eat toward the head. He crunches the flesh with his sharp back teeth, his rough tongue helping to clean the last morsel from each greasy bone. He may feed for as long as six or eight hours.

His hunger satisfied, he drags the remains of his meal into the underbrush to hide it from crows and vultures until he returns. Then he starts for the nearest watering place. After he has lapped the water he sets off for a cool, secluded spot where he may rest during the day. His path follows the easiest course—a dry stream bed up a low hill. On the way he may come face to face with a wild pig; each sees the other at the same time. The tiger hesitates, but he is already gorged with deer, and a full-grown pig is often a match for a well-fed, lazy tiger. So the tiger moves aside and the pig warily edges around him and escapes. The tiger proceeds up the dry creek bed and drops sleepily to the cool sand between the fern-edged banks. His striped body hides him perfectly, for it blends with the shadows cast by the long fern-fronds.

The tigress is busy, too, for she has two babies to protect and feed. She must also teach them to hunt; so shortly after dark she rouses the cubs, who are lively and hungry, rolling and scratching as they play. The three start off through the night, the cubs following their mother closely. They mimic her every movement. One cub carelessly brushes against the tall dry grass, causing a slight rustle. Its mother turns and cuffs it hard on the head, for cubs must learn to move without a sound when they are hunting. The tigress stops suddenly for she has seen a victim, a doe, romping with her fawns over a grassy opening surrounded by dense jungle. The tigers creep closer and lie in wait. As the deer's play brings them closer, the tigress rushes from her ambush and brings down the careless doe. The fawns run wildly away, each pursued by a young tiger, but a well-grown cub is too swift for a fawn. A few long leaps, and the baby tigers have made their first kill. Another year of learning to hunt with their mother and they will know the methods of stalking and the cunning which will enable them to get their living.

The Bengal Tiger is so-called from the State of Bengal in northern India, where it is abundant. It is found throughout southeastern Asia. There are other tigers, both larger and smaller, ranging from Siberia to Java and Sumatra. The tigers are members of the cat family.

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PLATED 1953

Natural History

FIELD MUSEUM STORIES

Rivers as Sculptors of the Land

Series XXXIV, No. 2
March 9, 1940

Looseleaf No. 20

RIVERS AS SCULPTORS OF THE LAND

Out of the hills of Habersham,
Out of the valleys of Hall,
I hurry amain to reach the plain,
Run the rapid and leap the fall,
Split at the rock and together again,
Accept my bed, or narrow or wide,
And flee from folly on every side
With a lover's pain to attain the plain
Far from the hills of Habersham,
Far from the valleys of Hall.

Song of the Chattahoochee by SIDNEY LANIER

The rivers that flow over the land carry great quantities of water to the sea. It would seem that after a while there would be no more water for the rivers. Where do they get so much water that they can flow on and on, year after year?

The story of water runs around like a circle. It rises as vapor from the sea, to make clouds in the sky. Some of those clouds are blown over the land and from them water again falls to the earth as rain.

About two-thirds of the rainwater either sinks into the earth or passes back into the air as vapor. The remaining third of that rainwater remains on the surface of the earth, to flow from the higher ground to low places, and eventually become the rivers.

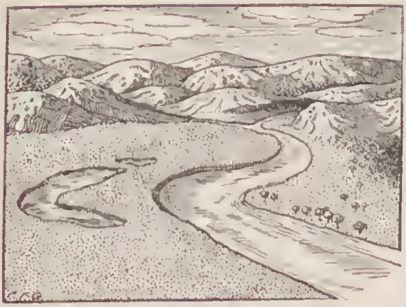
In the early days of the history of the land, when it first appeared above the level of the sea, there were no mountains nor deep valleys. However, the land was not smooth; it was like a field in which some of the ground is higher than other. When rain fell on the higher ground it ran to the lower ground just as tiny rills run from the high to the low ground in the fields of today.

The rills that trickle down to lower levels come together to make the brooks and as they come they wash from their pathways tiny bits of rock and soil.

If the brook flows in a country where mountains are rising it flows very rapidly and can carry a great load of rocks, both rock fragments and the fine debris that comes from the grinding together of the rocks that are being tumbled about in the rushing water. Such a stream cuts down a deeper channel in the rock.

Brooks come together to make rivers. A young river flows rapidly, carries a great deal of the debris that it gets from the cutting down of its stream bed. Its valley is narrow and its sides are very steep. It continues to cut down its channel until it approaches the level of the sea or the plain toward which it flows. Then it does not flow so rapidly nor wear its channel down to any greater depth.

The mature river drops much of the rock that it has been carrying. It no longer deepens its channel but it does cut its banks. The valley of the mature river becomes much wider and the steep banks on either side change to gentle slopes, as it follows a crooked pathway to the sea.



A RIVER AT WORK

The main current of the mature river tries to flow in a straight line but as it swings around the bends of its crooked channel, it strikes the opposite bank and cuts it away. The slow water at the edge of the current drops mud along the bank on the other side and builds up a flood plain.

As time goes on the flood plain widens and the river becomes an old meandering stream with an even more crooked channel through its own flood plain.

Sometimes its pathway is so crooked that it is like loops. If one of the loops is cut off when the river changes its way to flow across the neck of the loop there will be an ox-bow lake that in time may become a swamp. Ox-bow lakes are found only in the region of an old river bed.

The old river continues its unhurried way on to the sea. It carries millions of tons of soil that has been washed from the land by it and its many contributing branches.

It might seem that in time the earth would be worn down to be so flat that rivers could no longer do their work, but that never gets to be so. New mountains rise and rivers change their courses and their work continues on and on.

The face of the earth is never the same from one day to the next. Heat, frost, wind and water are always at work on it. The water that flows over the land as rivers does more than any other one thing to change the appearance of the face of the earth.

LEOTA GREGORY THOMAS
Raymond Foundation

NOTE: In the Geology halls in Field Museum are many exhibits that show how rivers change the appearance of the earth.

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FIELD MUSEUM STORIES

Mahogany—Green Gold of the Tropics

FIELD MUSEUM of NATURAL HISTORY
FOUNDED BY MARSHALL FIELD 1893
CHICAGO

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A BUTTRESSED TREE

Early Spanish explorers came to the New World seeking riches—yellow gold and rare spices. To repair their vessels, buffeted by fierce Atlantic storms during the long voyages, these early sailors soon learned to use the red wood of the mahogany tree. The timber was not only durable and resistant to pounding waves but it did not splinter easily. The sailors did not know that the red wood they used to mend the battered hulls of their boats was to become of greater value than the metal they sought. For mahogany is truly "green gold." Today the trunk of one tree, consisting of three or four logs, is worth $20,000 if the wood is beautifully figured, and a single log may be valued as high as $12,000.

Sir Walter Raleigh returned from one of his trips to the New World with a sturdy new rudder cut from firm mahogany wood, and when King Philip of Spain sent his Armada to conquer England, the vessels were made from mahogany. The wood for these ships was the first large cargo of timbers from the West Indies. Even now, as in the days of the Spanish explorers, mahogany is primarily used for sailing, not only through water but in the air. Fast speedboats and racers and parts of the propellers of airplanes are made of mahogany.

Mahogany was known for many years before cabinet-makers began to use it in the construction of furniture. The wood was too tough for the carpenters' crude tools. Later it was found that mahogany was strong enough to be cut into delicate pieces, and furniture made of this wood was greatly prized. At the present time solid mahogany is seldom used for furniture, as large pieces of the wood are too expensive. Thin sheets of mahogany wood are fastened over a core of some less expensive material such as oak. Furniture so made is said to be "veneered." Thus the beautiful color and texture of mahogany can be utilized in furniture manufactured at moderate cost.

Mahogany is found scattered in dense forest among hundreds of other varieties of trees. One plant explorer said that on a journey of eight hours' continuous marching through the jungle he was able to visit only seventeen trees that had previously been located by an Indian guide. Early loggers removed the finest trees that were of easy access and today full-grown trees are found only in regions remote from transportation.

Mahogany trees range between 100 and 150 feet in height. (Stanley Field Hall, in Field Museum, is seventy-five feet high.) In a jungle these trees grow taller than their neighbors, and the scouts who go out to locate mahogany trees climb a ridge or an especially tall tree to spot out the mahoganies.

A plant that grows so tall needs wide-spreading roots and a very large trunk to carry its leaves to the sunlight and protect its great bulk from tropical storms. A mahogany trunk is frequently eight to ten feet in diameter and clear of limbs for two-thirds its height. The enormous roots that grow around the base of the tree extend upward, buttressing the trunk and doubling its size for a height of about twenty feet (*see illustration*).

Usually the loggers build a light scaffold about fifteen feet above the ground and cut the tree above the buttressed portion of the trunk. This of course is wasteful as much valuable timber is left standing in the stump.

The felled tree is cut into logs twelve to thirty feet long and these logs are hewn square, chiefly because the squared logs can be stored in less space on board ship. A squared log may weigh as much as ten tons. Sometimes a special railroad track is built into the jungle for a mile or more just to bring out the logs from one tree. In other places a team of about one hundred men slides the logs down to a river. During the rainy season the logs are carried down stream to the sea. Here they are lashed together to form a raft and are floated out to a ship where they are lifted on board by crane.

Originally mahogany was lumbered in the West Indies. Later it was found in Central America, and today new trees are being located in tropical South America. Fine logs are being exported from Peru along the head-waters of the Amazon River and its tributaries. A lighter-colored mahogany is lumbered in tropical Africa. There is still plenty of timber in the interior of Central America, South America, and Africa although the finest trees in the West Indies have been cut down. In some places lumber companies and local governments are now experimenting with the growing of mahogany trees.

MARIE B. PABST
Raymond Foundation

NOTE: There are samples of mahogany wood in Hall 27 and in Stanley Field Hall.

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Field Museum of
Natural History

FIELD MUSEUM STORIES

Dinosaurs

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March 23, 1940

Looseleaf No. 22

DINOSAURS

A HORNED DINOSAUR

The dinosaurs were a kind of great reptile that lived many millions of years ago, before there were any men on the earth. They were of many different kinds and they varied in size from that of a house cat to that of great creatures fifteen or more feet in height and seventy-five feet in length.

We know that these great reptiles lived on the earth because their fossil bones and skeletons are found buried in the rocks in many places. These bones are petrified or turned into stone, and have been preserved in the rock ledges through long ages. Sometimes only a few bones are found in a place, but sometimes entire skeletons are found together. From these skeletons, which have been set up in different museums, the scientists have been able to make out what kind of creatures the dinosaurs were.

Fossil remains of dinosaurs are found not only in North America, but in South America, Europe, Asia, and Africa. This shows that these great creatures lived in all parts of the world. It is not known that any ever reached Australia.

The name "dinosaur" is taken from two Greek words which mean "terrible lizard." They were not exactly lizards, but probably as nearly like the lizard as any other animal now living on the earth. Many of the dinosaurs lived in the water, but some of them were capable of coming out and walking about on the land. Some of them were plant-eaters and the plant-eaters grew to very great size. Some of them were flesh-eaters, and fed upon the other dinosaurs. This is known by the very sharp teeth that these flesh-eaters had and the marks that are found in many cases on the bones of the plant-eating dinosaurs. Even the broken teeth of the flesh-eaters are sometimes found buried in the earth, scattered about the skeletons of the great plant-eating dinosaurs. This shows that the flesh-eaters were probably fierce animals and that they preyed upon the plant-eaters just as lions and tigers of modern times prey upon camels and elephants.

The dinosaurs vary greatly among themselves in their size and in the shape and the proportion of their bodies. The very oldest dinosaurs were quite small and most of them walked on four legs. Some of the later and largest of all dinosaurs also walked on four legs. These animals had small heads, very long necks, and long tails; the bodies were rather short and compact. The head was shaped very much like that of a lizard. Others of the dinosaurs walked on their hind legs with their bodies in a half upright position. Their forelegs were not so long as the hind legs, and some of them appeared to have been swimmers. Some of these swimmers had long heads with broad mouths and very small teeth and were called the "duck-bill" dinosaur. Another queer kind had great plates standing up in two rows and extending along the back from the neck to the tail. There were other plates which lay flat and served to protect the animal's back. Another kind of dinosaur was truly armored. These animals were shaped like the little horned toad which now lives in the sands of desert regions, and had bony plates covering the back arranged like true armor. The flesh-eating dinosaurs were apparently the most agile and swift-footed of all the dinosaur tribe. Their heads were large in proportion to the size of the body, and armored with rows of sharp pointed teeth like those of a crocodile. They walked or ran upon their hind legs, and their forelegs were so small that they could have been of use only for the purpose of seizing and holding their prey. The largest of all these flesh-eaters now known has the very imposing name of *Tyrannosaurus rex*, meaning "king of the tyrant lizards."

Fortunately, all of these creatures of the dinosaur tribe died out long before man came to live on the earth and before there were many warm-blooded animals of any kind. There were some very small mammals living at the time of the dinosaurs. Some scientists have thought that these little mammals may have eaten the eggs of the great dinosaurs and so exterminated them.

ELMER S. RIGGS
Department of Geology

NOTE: In Hall 38 may be seen skeletal remains of fossil dinosaurs, and murals showing the habits of these prehistoric animals.

FIELD MUSEUM STORIES

The Red Winged Blackbird

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March 30, 1940

Looseleaf No. 23

THE RED WINGED BLACKBIRD

RED WINGED BLACKBIRD

One of the signs of spring for which we watch is the return of our summer birds. They come to us from their winter sojourn in lands to the south that offer more abundant food than the blizzard-swept Chicago prairies and marsh lands. With longer days and warmer weather, the birds come back for as long a time as the climate is hospitable and the countryside lavish of its larder. One of the first arrivals, early in March, sometimes even during the later days of February, is the Red Winged Blackbird.

These blackbirds do not arrive in one grand entrance parade. They come in three installments, sometimes as much as two weeks elapsing between the various groups. The flocks often contain from thirty to three hundred birds. First come the older males. Each bird decides upon a likely spot for its future home—generally in a cattail swamp—and it "stakes claim." Noisy squabbles often result when some late arrival tries to overlap an earlier bird's property. Later come the females and last of all the young males.

During the courting season the brilliantly colored males make the marsh lands ring with their clear calls. Only rarely do the Red Winged Blackbirds return to the same mate each year. Occasionally two or three females will mate with the same male.

A Red Winged Blackbird's nest is remarkable in construction, in inaccessibility and desirability of site. It is carefully woven of the finest sedges and rushes and is skillfully fastened to weeds about three feet above the surface of the marsh water. Here the nest is safe from enemies on land, and it is even difficult to reach from the water. During the hot summer days the nest is shaded from the burning sun by tall weeds. The clutch—from three to five eggs—is laid in late April or May.

The eggs hatch in from ten to fourteen days, and the ugly little fledglings begin to make life busy for their parents. When the parents visit the nest, the featherless youngsters open their huge mouths and clamor for food. The parents make many trips during the day, carrying insects such as larvae of gypsy moths, tent caterpillars, weevils, and grasshoppers, in an attempt to satisfy the ravishing appetites.

The natural food of the Red Winged Blackbird is about three-fourths weed seeds and one-fourth insects. These birds have been condemned as a nuisance because they also eat freshly planted seeds and young corn, but they really benefit the farmer by eating large numbers of grasshoppers and weevils that would destroy his crops.

As the chill nights and cool days of autumn kill off the host of insects in the fields and over the swamps, the food supply of the Red Wings becomes scarce. The birds move on to more hospitable regions where there is abundant insect life upon which they can feed. In the fall, blackbirds flock together in large groups. Later, hundreds of these birds in one large mass start on their southward migration. They spend the winter in the southern part of the United States, although a few birds may remain in southern Illinois.

If you should be out near a marsh or a swampy meadow this spring, watch for the Red Wings. You will have no difficulty in identifying these robin-sized birds. The males are glossy black, with bright scarlet, gold-edged patches on the shoulders. The brown female looks very much like an oversized sparrow and is quite inconspicuous among the cattails and reeds. But its bill is very different from the thick, heavy bill of a sparrow. The blackbird has a fairly long bill, well adapted for securing its insect food and quite unlike the seed-crushing bill of a sparrow.

MARIE B. PABST
Raymond Foundation

NOTE: In Hall 20 is a case showing some of the Chicago marsh birds. One corner of the case has a nest and young of the Red Winged Blackbird.

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FIELD MUSEUM STORIES

Ocean Sponges

FIELD MUSEUM of NATURAL HISTORY
FOUNDED BY MARSHALL FIELD 1893
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OCEAN SPONGES

FISHING FOR SPONGES

For a long time people thought that sponges were plants, because many of them grow branches like plants and all of them remain growing in one place. It was only after men began to study sponges, to find how they were built and how they caught and digested their food, that we discovered that they were animals.

Sponges are very aristocratic animals indeed, for we can trace their ancestors back about half a billion years. The fact that they have lived for such a long time without changing very much makes us believe that they are perfectly fitted for living as they do.

There are many different kinds of sponges living in both the sea and fresh waters. Some have skeletons made of limy material, and the skeletons of others are like glassy threads, while the ones we see most often, the bath sponges, have fibrous, horny skeletons made of material called "spongin." The first two kinds are not used by man, but for the horny type we find many uses.

In their natural state sponges look very different from those we see in the store. When alive they are covered with a thin slimy "skin," usually dark-colored and full of holes or pores. These holes open into canals that run through all parts of the sponge's body. The canals are lined with many tiny cells, each of which bears a small whip. When these whips are lashed, water is drawn in through the tiny pores, driven through the canals inside, and forced out through the larger holes near the top of the sponge. As the water goes past, most of the tiny food particles are captured by the whip-bearing cells. Thus the sponges draw their food to them so they do not have to move about.

Sponges multiply by producing eggs, and these eggs hatch tiny little animals that are able to swim weakly about. These young are very different from the adults. After a while they settle down and grow fast to the rocks or often to some dead seashell at the bottom of the sea, and are never free to wander again. Sponges also multiply by growing new stalks out from their bodies. These stalks may break off and continue growing by themselves. Strangely enough, a complete sponge will grow from almost any piece that has been broken from a living sponge.

No animals in the sea are known to eat sponges. Perhaps the sponges have a disagreeable odor or flavor. At any rate they have no problem of protecting themselves from enemies. A great many animals live in the sponge's body. Some special kinds of crabs, worms, snails, and clams find that the inside of the sponge makes an excellent house.

Sponges, or rather their skeletons, have been used by people for a long, long time. The ancient Greeks used them for bathing, for scrubbing tables and floors, and also for padding their helmets and armor. The Romans used sponges for paint brushes and mops, and even burned them and used the ashes for medicine.

The soft sponges used by men grow only in warm seas. The best places to fish for them are the coast of Florida, the West Indies, and the Mediterranean Sea. In Florida the sponges grow in water from ten to fifty feet in depth. The sponge fishermen go out in sail-boats and then work from small, flat-bottomed row-boats to collect the sponges. Two men usually man the boat; one rows while the other looks down through the water to locate the sponges. In order to see more clearly into the water, glass-bottomed buckets are used. When the sponges are seen, they are brought up by means of a sharp-curved, double hook on the end of a long pole. After a boat load of sponges is gathered, they are brought to land and laid out on the beach so that the soft jelly-like covering will rot away. Then they are washed in the sea, trimmed so that they will have a more regular outline, and beaten with wooden hammers that crush the shells of the shrimps or clams that were living inside. After this cleaning and trimming process the sponges are packed in bales to be sold.

In the Mediterranean the sponges grow in deeper water than on the coast of Florida. Instead of fishing with long poles, divers go down and pick the sponges from the bottom. A diver usually stays beneath the water from a half minute to a minute. During this time he gathers all the sponges he can find. His work is very hard because of the pressure of the deep water into which he dives. Often divers use diving helmets or suits; then they can stay under the water much longer. The Mediterranean sponges are much softer and finer than those of the West Indies or Florida.

LOREN P. WOODS
Raymond Foundation

NOTE: The skeletons of the three main kinds of sponges may be seen in Hall M.

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FIELD MUSEUM STORIES

The Plants in a Woodland Community

Series XXXIV, No. 7
April 13, 1940

Looseleaf No. 25

THE PLANTS IN A WOODLAND COMMUNITY

WOODLAND IN EARLY SPRING

Nearly all green plants require light, water, heat, and soil in order to carry out their life processes and make their food. Some shade-loving plants require very little light; other plants need a great deal. Some plants get much light because they are taller or more spreading than their neighbors and so are not shaded. In a forest the trees affect the conditions of heat, light, water, and wind; and these conditions in turn affect the plants which live beneath the trees. The trees have a protecting effect. They reduce the amount of evaporation, and help to keep the forest damp.

The smaller trees, the bushes, and the herbs are able to grow in the dimmer light underneath the taller trees. In dense forests the screen above cuts off so much light that few plants can grow underneath, but in most woodlands there is sufficient light filtering through the leaves so that many different kinds of smaller plants are able to grow.

Such conditions in the woodlands bring about zones or layers in the vegetation, the plants in each layer being better adapted for growing in a less intense light than those in the one above. In forests where most trees shed their leaves in winter there are usually three or four such zones. Below the canopy of the tallest trees is a layer made up of smaller trees and tall shrubs. These small trees are quite often young and may eventually grow to be as tall as the largest trees. The plants which are able to grow in the still denser shadow of the double layer above are the low bushes and herbs. These range in size from a few inches to three or four feet in height. The lowest layer, one for which you must look closely, is the mossy covering on the rocks, the decaying trees, or the ground.

The particular season during which the smaller plants do most of their blooming and growing is largely determined by the amount of available light, moisture, and space. Most of the plants which make up the layer on the forest floor start their seasonal activities as soon as conditions become favorable in the spring. The early spring flowers are sure to have a good water supply. The melting winter snows and the spring rains have combined to saturate the soil. In early spring there is plenty of light on the floor of the forest because the bushes and trees do not yet have their leaves. Many plants such as the skunk cabbage, hepaticas, bloodroots, spring-beauties, adder's tongue, and blue phlox get an early start, often while the ground is still partly frozen, because they have stored food material in their bulbs, roots, or rootstocks. This enables them to grow their leaves and bloom long before the bushes and trees get their leaves and shade the ground.

A little later the forest floor begins to support larger leafy plants such as white trillium, jack-in-the-pulpit, and May apples; the smaller spring plants, crowded and shaded, are maturing their fruit and become relatively inactive. The later herbs are able to grow in the diffuse light of the forest after the leafy canopy has been formed. Then after a month or two of blooming they in turn are crowded out by plants adapted for summer growth in forests. So in the forest community there is a continuous change in the plant growth from early spring until summer, from the shortest seedlings and herbs on the forest floor, through the different layers, to the topmost, the trees.

LOREN P. WOODS
Raymond Foundation

NOTE: A scene which shows many plants typical of the forests near Chicago in the springtime may be seen at the north end of Hall 29.

FIELD MUSEUM STORIES

Insect Mimicry and Protective Coloration

Series XXXIV, No. 8
April 20, 1940

Looseleaf No. 26

INSECT MIMICRY AND PROTECTIVE COLORATION

THE MONARCH BUTTERFLY

In nature there is a constant war being waged by the strong on the weak. Those insects that belong to the weaker class are not powerful enough to fight back, so they must outwit their enemies in other ways. A small group of insects, mainly the bees and the wasps, can well protect themselves by stinging a would-be foe, and others emit pungent odors or have irritating spines or hairs; but in the majority of cases the most widely used means of protection employed by insects is that of remaining unseen. This does not necessarily mean that the insect, wishing to hide, shuts itself away from the outside world. So closely do some insects resemble their surroundings that they can live in the very midst of their enemies and still not be recognized. This ability is sometimes called protective coloration.

The common walking-stick is a good example of an insect that looks so much like the twigs upon which it lives that it takes a sharp-eyed bird to see where the insect stops and the twig begins. The walking-stick has a slender body, from two to three inches in length. It is wingless and has three pairs of legs. When at rest it holds the first two legs directly in front of its body to complete the illusion of looking like a small stem. When the walking-stick is young, it is green in color. As it grows older it changes to brown, and so, by selecting brown twigs or fresh green ones as resting places, easily escapes detection because it looks so much like a twig itself. It feeds greedily on leaves and is sometimes harmful to walnut and other trees.

The ability of the walking-stick to look like something other than itself is possessed by other insects also. Measuring worms look like twigs; mourning-cloak butterflies resemble dead leaves; certain kinds of moths have the appearance of bark, while some tree hoppers imitate thorns.

One type of insect, found in the islands of the Indian Ocean, looks like a leaf and is called a "leaf insect." It is usually bright green in color and measures about three inches in length. Its foliage-like appearance is due to the broad, ribbed wings and to the leaflike expansion at the joints of the legs. Even the eggs bear a curious similarity to the seeds of plants. Leaf insects are found at the tips of leafy branches, and because of their form and color are not readily discovered. They feed upon leaves at night and are usually quiet during the day. They are members of the same family as the walking-stick.

The praying mantis that lives in this part of the country is colored green, especially when young, and, like the walking-stick, mimics the twigs upon which it lives. Some species living in the tropical countries are brightly colored and resemble flowers. By sitting among the flowers that they have taken as a model, they attract insects and devour them. What a clever trapper the praying mantis is!

Birds that eat insects soon learn to recognize the bad-tasting ones by size, form, and especially color, and so leave them alone. It often happens that edible insects look like some of the insects that are bad tasting and in this way escape being eaten. Such a relationship has been established by the viceroy butterfly for the monarch butterfly. The monarch, or common milkweed butterfly, has a bitter flavor and is carefully avoided by the birds. On the other hand the viceroy, which has no bitter taste and is not even closely related to the monarch, resembles the monarch so much that birds will also refuse to eat it. Perhaps they leave the viceroy alone because they mistake it for the monarch.

This imitation of one insect by another for protection is known as mimicry. Numerous defenseless moths and flies are colored so much like stinging bees and wasps that they are, no doubt, commonly avoided by their natural enemies. These mimics take advantage of the distaste which their enemies have connected with the yellow and black appearance of bees and wasps, and with these "sham warnings" have a better chance of escape.

Bert E. Grove
Raymond Foundation

NOTE: In Hall 18 there are on exhibition the monarch and the mimic viceroy butterflies, the mourning-cloak butterfly, and some of the moths and flies that resemble bees and wasps.

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FIELD MUSEUM STORIES

The Importance of Conservation

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Looseleaf No. 27

THE IMPORTANCE OF CONSERVATION

When the first settlers came into the hill country of the eastern part of the United States, they found clear, sparkling streams winding their way to the sea through forest-clad hills. The binding roots of the trees held the stream banks firm. The grass-covered hillsides and the open woodlands were not washed away even when very heavy rains came.

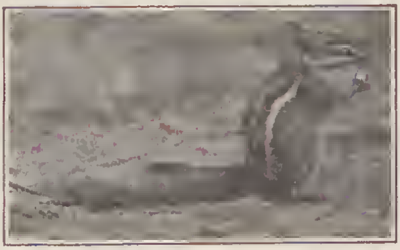
JACK-IN-THE-PULPIT

After the white man came that was changed. He cut away the forest to make a clearing for his home and fields. There seemed no end to the wooded lands and it never occurred to him that he should replace the trees that he was cutting down. He saw no warning in the mud-stained streams that began to cut back their banks in the spring freshets. He never realized that every washing rain took a little more of the rich top-soil from his fields and carried it to the sea.

Today, barren hillsides and deep gullies scar the land that once teemed with life and offered protection to man and beast. The animal life of a region changes with the destruction of forest and grassland; the deer must seek the shelter of another woodland; the beaver hunts for a quiet, secluded stream; the raccoon goes into hiding in the tall tree near a quiet marsh or stream, and bird neighbors change. It takes more than the age of one generation to replace the forests and heal the damage done by the first thoughtless use of our natural resources.

As settlers moved westward, rapid change continued. Farm lands were cultivated at the expense of the forest; swamps were drained; cities were built; railroads brought many people. There is little of forest or meadow left undisturbed. The fertility of the soil has been used up by repeated planting of corn and wheat or other crops. Open woodlands have been grazed by horses and cattle and sheep until the young trees have had no chance to grow up and replace the old forests that are dying out.

The floor of forest and meadow is fast losing the lovely spring flowers that add so much of beauty to the landscape. What is happening to the trillium, the bloodroot, the hepatica, Dutchman's Breeches and Jack-in-the-pulpit?


CHIPMUNK

The chattering squirrels grow less challenging as they learn the fear of man and dog. The skunk, natural enemy of insects, now has fewer hiding places and is disappearing.

What shall we do with all the rabbits that eat the bark of young trees. Foxes could keep them under control, but they too have been hunted or driven out.

When man spoils the natural control of things in the great outdoors, he must provide a means of control or pay a heavy price for his lack of wisdom. He kills off the snakes and puts a bounty on the heads of owls and hawks and then loses his stored grain because of hungry mice and rats.

SCREECH OWL

The wild-life preserves are safe refuges for some but not all of the native life of a region. Man himself is probably the least protected of any life in any place.

In our race for progress why do we not stop to consider the relative values of such things? Why tap the alpine lake for water power when such power could be taken from the sunlight and the lake left for a fisherman's paradise? Man must have food and shelter and clothing, but he must have more than that if he is to live well. He must have places where he can sometimes go away from the maddening rush of civilization; to the quiet lake; to the long stretch of shore; the fastness of the deep forest—there to recreate within himself the courage for living.

Natural resources must contribute to man's welfare and be protected for that purpose. They must become a part of the Conservation program of any people who want to stabilize their culture and prolong the life of their nation.

LEOTA G. THOMAS
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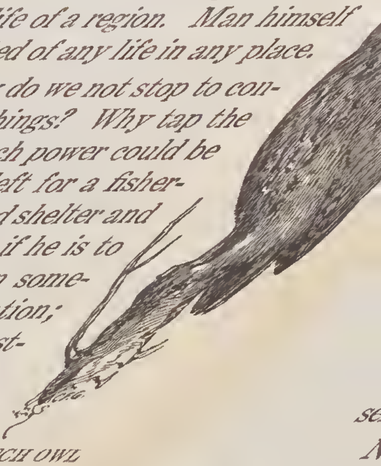

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